Field Report for Airborne Data Collected In Support of US EPA Region VI Intercontinental Terminals Company LLC Fire 21 March 2019

Background

On 17 March 2019 a large fire was reported at the Intercontinental Terminals Company LLC (ITC) located in Deer Park, TX. Local reports indicate that the fire started at about 1030 local in an 80,000 barrel (capacity) tank storing naphtha. The ITC facility is located on the southern shore of the Houston ship channel in the City of Deer Park, TX. The geographical coordinates of the facility are 19.7322N, 95.1236W (figure 1).

The material reported in the fire is Naphtha. Naphtha is generally composed of either the first or second sequence of distillate obtained during primary distillation. Light naphtha is composed of light fraction straight chain and simple aromatics, typically less than 6 carbons while heavy naphtha consist of larger compounds (C6 plus) which normally is used as feed for catalytic cracking. Since the fraction of Naphtha is crude dependent, there is not a simple formula for the material.

The US EPA Region VI requested that the ASPECT system be deployed to provide monitoring support on 17 March 2019 and ASPECT completed a 7 pass mission at 1847 local. Acetone was detected on the first 2 passes (data collection 3 and 4) which were near the fire at a concentration estimated below 1 ppm (0.154 ppm and 0.357 ppm, respectively). No other compounds were detected.

ASPECT conducted a second flight over the facility on 18 March 2019. Analysis of IR data confirmed reports that the fire had expanded to multiple tanks. Specifically, the thermal signature of the fire and resulting heated air plume was measurably larger than that observed in the first flight. Crew reports indicated that the plume rise was still active with the lofted plume occupying a region between 2000 and 6500 feet above ground with movement to the west. Spectral analysis of FTIR data indicated that compounds including 1-butene, 2-butene, isoprene, and acetone were detected primarily in a downwind portion of the plume with the highest values being just above 1 ppm.

ASPECT conducted a third flight over the ITC fire on 19 March 2019. Analysis of data indicated that the fire had grown as evident by the larger thermal signature and direct confirmation from aerial images. Plume geometry was assessed with the aircraft with findings showing the plume was about 47 miles in length, 17 miles wide at the largest extent and ranged in altitude from a floor of 1500 feet to a ceiling of 5000 feet. No chemical detections were reported on this flight.

ASPECT conducted a fourth flight over the ITC fire on 20 March 2019. Analysis of data indicated that the fire had been extinguished. Analysis of FTIR data showed detections of acetone and SO_2 to the west of the farm and isobutylene and isoprene south of the farm. All concentrations were detected below 1 ppm.

Due to reports of vapors observed in the Deer Park vicinity ASPECT was requested to fly a mission on 21 March 2019 which is detailed in the following report. In general, the design of this flight called for data collection near the impacted tank farm, and locations in Deer Park, La Porte, Galena Park and Jacinto City.

Figure 1: ITC, Deer Park, TX

ASPECT response to this Mission/Incident was in support of:
US EPA Region 6. OSC: Adam Adams

ASPECT System

The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 3,000 ft AGL). The system consists of an airborne high speed Fourier transform infrared spectrometer (FTIR) coupled with a wide-area IR line scanner (IRLS). The ASPECT IR systems have the ability to detect compounds in both the 8 to 12 micron (800 to 1200 cm-1) and 3 to 5 micron (2000 to 3200 cm-1) regions. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon - non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The carbon - hydrogen stretch is very common in this region.

A digital Nikon DX2 camera (12.4 mega pixel CMOS 3:5 aspect ratio, 28 mm wide-angle lens) collects visible aerial imagery as part of the core data product package. The camera timing system is connected to the primary IR sensors and provides concurrent

image collection when other sensors are triggered. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while in flight or approximately 600 frames per hour can be processed once the data are downloaded from the aircraft.

An Imperx mapping camera (29 mega pixels; mapping focal plane array) provides a similar aspect ratio and aerial coverage. Like the Nikon DX2, it is connected to the primary IR sensors and provides concurrent image collection when other sensors are triggered. These images are often digitally processed in lower resolution so they can be transmitted via satellite communication. The high resolution images (>20 MB each) are pulled from the ASPECT after the sortie and are available at a later time.

All aerial photographic images collected by the ASPECT system are ortho-rectified and geospatially validated by the reachback team. In general, this consists of conducting geo-registration using a Digital Elevation Model (DEM) which promotes superior pixel computation and lessens topographic distortion. The image is then check by a team member (using a Google Earth base map) for proper location and rotation

Data is processed using automated algorithms onboard the aircraft with preliminary results being sent using a satellite system to the ASPECT reachback team for QA/QC analysis. Upon landing preliminary data results are examined and validated by the reachback team.

Data Results Flight 5, 21 March 2019

Weather Conditions and Crew Report

Weather for the mission is given in table 1. The crew reported that winds at altitude (2800 ft) were from the north (000 degrees) at about 15 kts (7 m/s). No visible emissions were observed being generated by the tank farm. .

Table 1. ITC Fire Mission Weather 20 March 2019

Parameter	Surface (0900)	Surface (1100)	Surface (1215)
Wind direction	090 degrees	000 degrees	090 degrees
Wind speed	1 m/s	2.5 m/s	1 m/s
Temperature	16ºC	22 ºC	22 ºC
Humidity	63%	38%	25%
Dew Point	9ºC	3 ºC	1 ºC
Pressure	1021 mb	1021 mb	1021 mb
Ceiling	Not Reported	Not Reported	Not Reported

The order to launch the aircraft was given at 0845 local on 21 March 2019 and the aircraft was airborne at 0900. The initial data collection run over the site was at 0921 (local) and the aircraft made a total of 20 data collection passes; flight information is summarized in Appendix A and Figure 2.

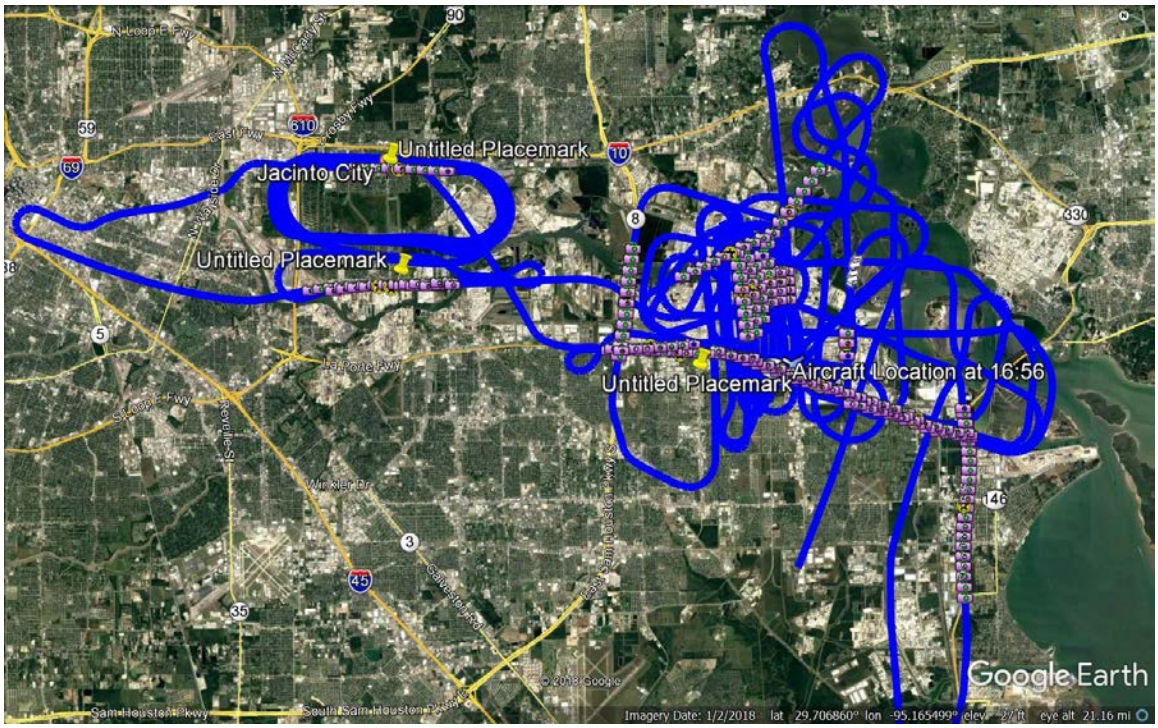

Figure 2: Flight line data for 21 March 2019. The blue lines represent the ASPECT flight path, green lines represent when the Infrared Line Scanner was actively collecting data, and the camera icons represent when a photo was taken.

General Data Quality Objective

The following general data quality objectives are employed in conducting emergency response data collection with ASPECT:

1. To support overall situational analysis of the incident including aerial photography and IR imagery
2. To screen the incident for the presence of selected chemicals
3. To estimate the location and concentration of plumes being generated by the incident.

Line Scanner Data Results

A total of 1 test and 20 data passes were made in the proximity of the impacted tank farm also in extended areas surrounding the site and an infrared line scanner image was generated for each pass. Figure 3 shows a typical 3-band infrared image obtained from data collected for Run 5. Examination of the IR image shows a typical industrial scene. Thermal contours are included on the image and show that the tank farm is essentially at approximately 30 ºC. It should be noted that process units in the general area are warmer than the tank farm. No plumes were detected in the image.

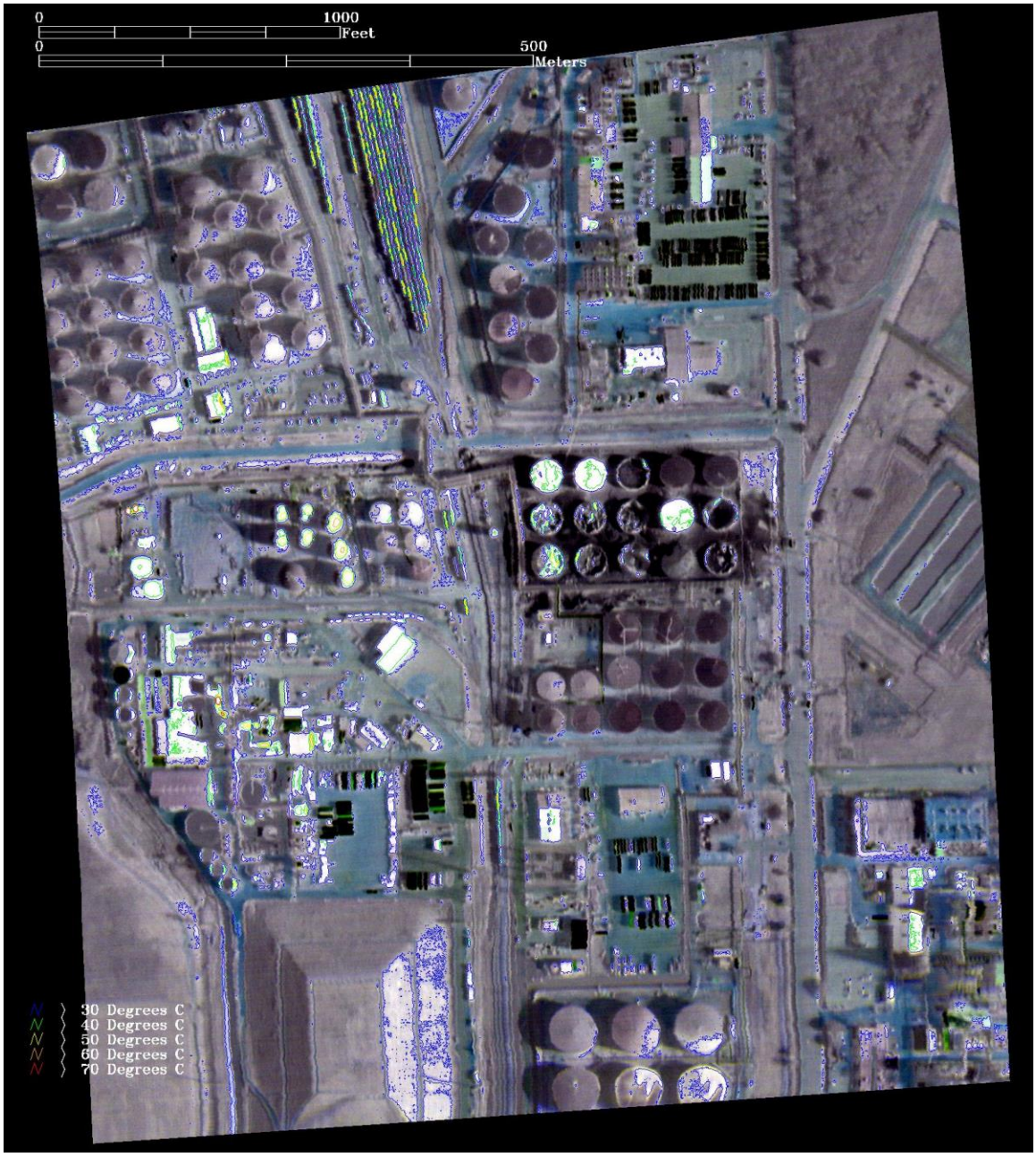

Figure 3: IR and Thermal analysis of ITC data for 21 March 2019, Run 2

In addition to a focus near the tank farm, ASPECT also conducted a general patrol in extended areas surround Deer Park. Figure 4 is a representative example of a long line scanner collection (Run 11) along highway 225. Analysis of the image showed no unusual signatures.

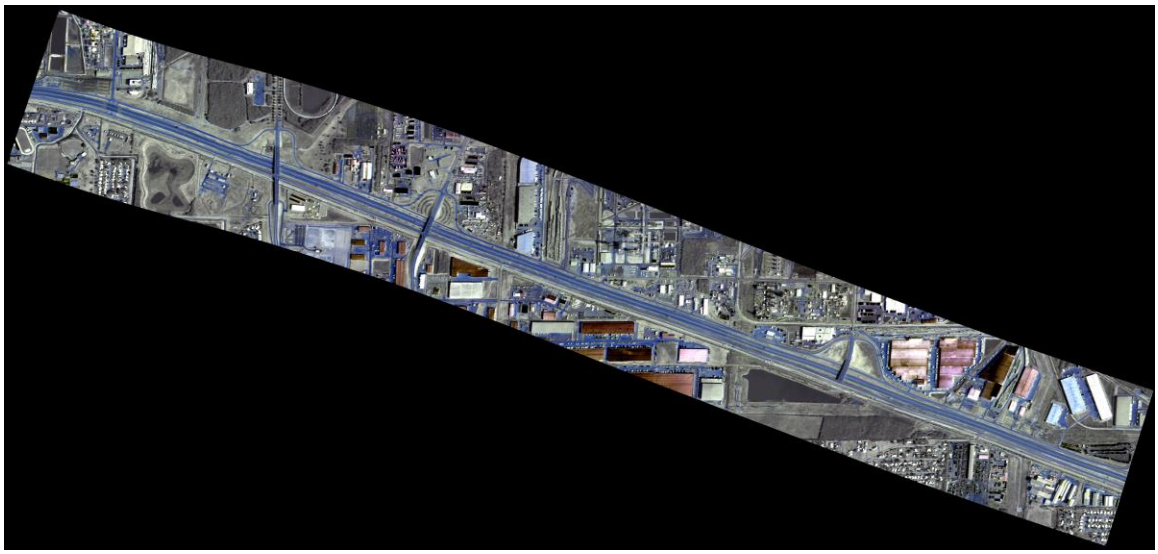

Figure 4: IR image along highway 225, 21 March 2019, Run 11

FTIR Data Results

FTIR Spectral data at a resolution of 16 wavenumbers was collected for each pass. ASPECT uses an automated detection algorithm to permit compounds to be analyzed while the aircraft is in flight. 72 compounds are included in this algorithm and the list and associated detection limits are given in Table 2. In addition, collected data are also manually analyzed by comparing any detected spectral signatures to a collection of published library spectra.

An examination of FTIR data collected on this mission showed low level detections in the general vicinity around the tank farm (Figure 5). These detections included both acetone and isobutylene at levels less than about 1 ppm. Based on the wind direction these detections are likely associated with the normal atmosphere of the urban area.

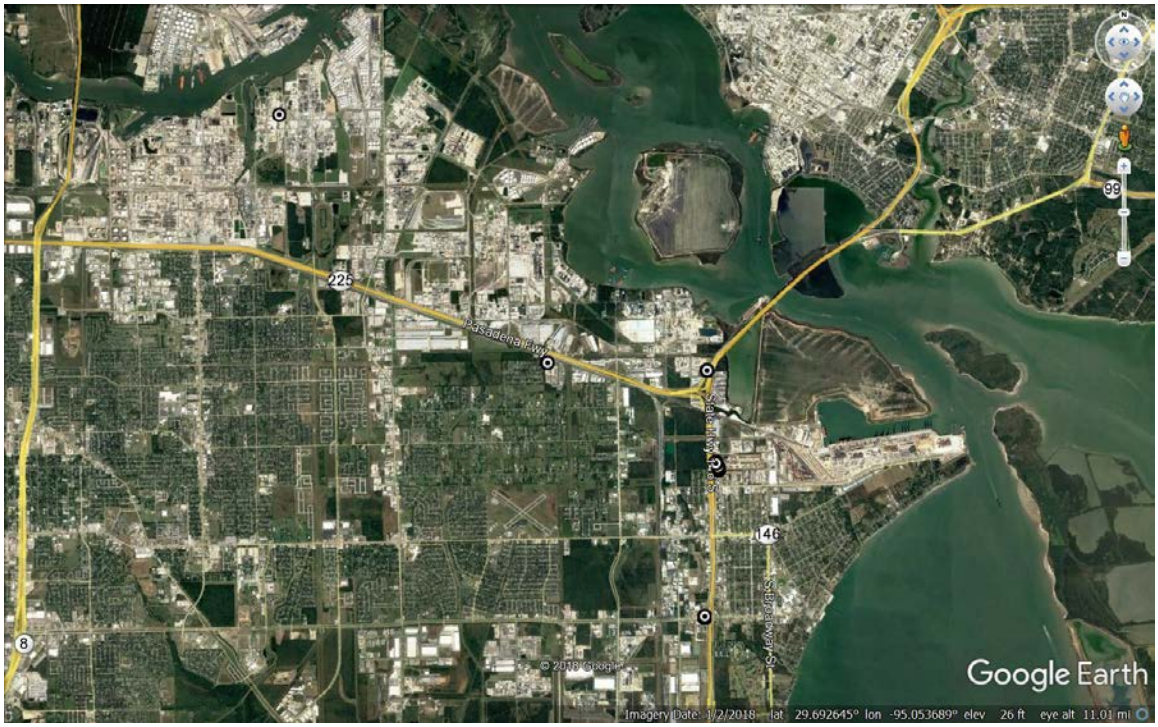

Figure 5: ITC Fire, Chemical Detection Locations – 20 March 2019

A summary of chemical detections is given in table 3.

Table 3. Chemical Results Summary

Run	Date	Time (UTC)	Chemical	Max Concentration ppm
1	21 March 2019	0910	Test	Test
2		0921	ND	None
3		0925	ND	None
4		0929	ND	None
5		0933	ND	None
6		0936	ND	None
7		0940	ND	None
8		0945	Isobutylene	0.26
9		0950	ND	None
10		0959	ND	None
11		1007	ND	None
12		1017 1017A	Acetone Isobutylene	1.03 0.77
			Acetone	0.39
13		1028	Acetone	0.26
14		1038	ND	None
15		1043	ND	None

16		1052	ND	None
17		1058	ND	None
18		1105	ND	None
19		1138	ND	None
20		1143	ND	None
21		1154	ND	None
ND – Non-detect				

Aerial Photography Results

A full set of high resolution aerial digital photography were collected as part of the flight. Figure 6 shows a representative overhead image collected as part of each pass. As evident in the image, the fires associated with the tank farm are absent. In addition, the secondary containment area of the tank farm appears to be filled with a white substance. Figure 7 illustrates a typical oblique image. Both images confirm the finding that the fire has been extinguished and that the secondary containment is filled with a white substance.

Figure 6: Aerial Image of the ITC Tank Farm, Flight 5

Figure 7: Oblique Image of the ITC Tank Farm, Flight 5

Conclusions

ASPECT conducted a fifth flight over the ITC tank farm and surrounding area on 21 March 2019. Analysis of data showed normal temperatures within the farm and low levels of typical compounds within the urban atmosphere. Detected compounds included acetone and isobutylene at concentrations at or below 1 ppm.

Appendix A

Abbreviations:

DEM – Digital elevation model
Alt – Altitude (in feet)
MSL – Mean sea level altitude (in feet)
Digital – Digital photography file from the Nikon D2X camera
MSIC – Digital photography file from the Imperx mapping camera
FTIR – Spectral IR data collected with a Fourier Transform Infrared Spectrometer
IRLS – Infrared Line Scanner
Jpg – JPEG image format
UTC – Universal Time Coordinated
img – Spectral data format based on Grams format

```
Mission:   2019-03-21 Houston Refinery Fire

Date:      3/21/2019
Time UTC: 14:03

Aircraft Number: N9738B
Pilot: James Glaviano
Copilot: Beorn Ledger
Operator: Steven Brister
Aft Operator: Jimmy Crisp
Ground Controller: Bob Kirby

DEM: Using elevation from DEM Database
-----------------------------------------------------------------

Run: 1 Time: 14:10:27 UTC
        Alt: 2980 ft MSL  Elev: 22 ft  Elevation from DEM Database
        Vel: 107 knots  Heading: 179

Digitals:  None
MSIC: 3
        20190321141033311.jpg
        20190321141039660.jpg
        20190321141046930.jpg
FTIR: 1
        20190321_141031_A.igm
IRLS: 1
        2019_03_21_14_10_32_R_01 TA=8.1;TB=27.9;Gain=3
Gamma Runs:  None

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```
Run: 2 Time: 14:21:11 UTC
        Alt: 2780 ft MSL  Elev: 18 ft  Elevation from DEM Database
        Vel: 93 knots  Heading: 355

Digitals:  None
MSIC: 4
        20190321142117039.jpg
        20190321142124293.jpg
        20190321142130658.jpg
        20190321142137007.jpg
FTIR: 1
        20190321_142115_A.igm
IRLS: 1
        2019_03_21_14_21_16_R_02 TA=6.7;TB=26.7;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 3 Time: 14:25:20 UTC
        Alt: 2728 ft MSL  Elev: 27 ft  Elevation from DEM Database
        Vel: 99 knots  Heading: -3

Digitals:  None
MSIC: 4
        20190321142526709.jpg
        20190321142533074.jpg
        20190321142539423.jpg
        20190321142545788.jpg
FTIR: 1
        20190321_142524_A.igm
IRLS: 1
        2019_03_21_14_25_25_R_03 TA=9.1;TB=29.1;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 4 Time: 14:29:14 UTC
        Alt: 2841 ft MSL  Elev: 27 ft  Elevation from DEM Database
        Vel: 97 knots  Heading: 358

Digitals:  None
MSIC: 4
        20190321142920965.jpg
        20190321142927314.jpg
        20190321142933679.jpg
        20190321142940028.jpg
FTIR: 1
        20190321_142918_A.igm
IRLS: 1
        2019_03_21_14_29_19_R_04 TA=9.5;TB=29.5;Gain=3
Gamma Runs:  None

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```
Run: 5 Time: 14:33:05 UTC
        Alt: 2900 ft MSL  Elev: 15 ft  Elevation from DEM Database
        Vel: 102 knots  Heading: 353

Digitals:  None
MSIC: 5
        20190321143311602.jpg
        20190321143317936.jpg
        20190321143324285.jpg
        20190321143330634.jpg
        20190321143336999.jpg
FTIR: 1
        20190321_143308_A.igm
IRLS: 1
        2019_03_21_14_33_10_R_05 TA=9.8;TB=29.8;Gain=3
Gamma Runs:  None

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Run: 6 Time: 14:36:44 UTC
        Alt: 2874 ft MSL  Elev: 16 ft  Elevation from DEM Database
        Vel: 112 knots  Heading: 351

Digitals:  None
MSIC: 6
        20190321143650383.jpg
        20190321143656748.jpg
        20190321143703097.jpg
        20190321143709447.jpg
        20190321143715812.jpg
        20190321143722161.jpg
FTIR: 1
        20190321_143647_A.igm
IRLS: 1
        2019_03_21_14_36_49_R_06 TA=10.0;TB=30.0;Gain=3
Gamma Runs:  None

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Run: 7 Time: 14:40:51 UTC
        Alt: 2898 ft MSL  Elev: 13 ft  Elevation from DEM Database
        Vel: 126 knots  Heading: 352

Digitals:  None
MSIC: 8
        20190321144057336.jpg
        20190321144103701.jpg
        20190321144110051.jpg
        20190321144117320.jpg
        20190321144123670.jpg
        20190321144130019.jpg
        20190321144136384.jpg
        20190321144142733.jpg
FTIR: 2
```

```
        20190321_144055_A.igm
        20190321_144134_A.igm
IRLS: 1
        2019_03_21_14_40_56_R_07 TA=10.5;TB=30.4;Gain=3
Gamma Runs:  None

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Run: 8 Time: 14:45:15 UTC
        Alt: 2894 ft MSL  Elev: 14 ft  Elevation from DEM Database
        Vel: 123 knots  Heading: 352

Digitals:  None
MSIC: 8
        20190321144521544.jpg
        20190321144527909.jpg
        20190321144534258.jpg
        20190321144540608.jpg
        20190321144546973.jpg
        20190321144553322.jpg
        20190321144559687.jpg
        20190321144606036.jpg
FTIR: 2
        20190321_144519_A.igm
        20190321_144558_A.igm
IRLS: 1
        2019_03_21_14_45_20_R_08 TA=9.9;TB=29.9;Gain=3
Gamma Runs:  None

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Run: 9 Time: 14:50:24 UTC
        Alt: 2881 ft MSL  Elev: 19 ft  Elevation from DEM Database
        Vel: 112 knots  Heading: 8

Digitals:  None
MSIC: 11
        20190321145031149.jpg
        20190321145037498.jpg
        20190321145043863.jpg
        20190321145050212.jpg
        20190321145056577.jpg
        20190321145102927.jpg
        20190321145109276.jpg
        20190321145115641.jpg
        20190321145121990.jpg
        20190321145128355.jpg
        20190321145134704.jpg
FTIR: 2
        20190321_145029_A.igm
        20190321_145107_A.igm
IRLS: 1
        2019_03_21_14_50_29_R_09 TA=10.2;TB=30.2;Gain=3
Gamma Runs:  None
```

Run: 10 Time: 14:59:43 UTC
Alt: 2882 ft MSL Elev: 21 ft Elevation from DEM Database
Vel: 113 knots Heading: 86

Digitals: None
MSIC: 14
20190321145949516.jpg
20190321145956785.jpg
20190321150003135.jpg
20190321150009500.jpg
20190321150015849.jpg
20190321150022198.jpg
20190321150028563.jpg
20190321150034913.jpg
20190321150041277.jpg
20190321150047627.jpg
20190321150053976.jpg
20190321150100341.jpg
20190321150106690.jpg
20190321150113055.jpg
FTIR: 3
20190321_145947_A.igm
20190321_150026_A.igm
20190321_150105_A.igm
IRLS: 1
2019_03_21_14_59_49_R_10 TA=11.4;TB=31.4;Gain=3
Gamma Runs: None

Run: 11 Time: 15:07:32 UTC
Alt: 2929 ft MSL Elev: 22 ft Elevation from DEM Database
Vel: 127 knots Heading: 102

Digitals: None
MSIC: 17
20190321150738009.jpg
20190321150744359.jpg
20190321150750724.jpg
20190321150757978.jpg
20190321150804343.jpg
20190321150810692.jpg
20190321150817058.jpg
20190321150823407.jpg
20190321150829756.jpg
20190321150836121.jpg
20190321150842471.jpg
20190321150848820.jpg
20190321150855185.jpg
20190321150901534.jpg
20190321150907899.jpg

```
        20190321150914249.jpg
        20190321150921518.jpg
FTIR: 3
        20190321_150735_A.igm
        20190321_150814_A.igm
        20190321_150854_A.igm
IRLS: 1
        2019_03_21_15_07_37_R_11 TA=13.6;TB=33.4;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 12 Time: 15:17:32 UTC
        Alt: 2856 ft MSL  Elev: 13 ft  Elevation from DEM Database
        Vel: 100 knots  Heading: -1

Digitals:  None
MSIC: 21
        20190321151739058.jpg
        20190321151745407.jpg
        20190321151751757.jpg
        20190321151758121.jpg
        20190321151804471.jpg
        20190321151810836.jpg
        20190321151817185.jpg
        20190321151823534.jpg
        20190321151829899.jpg
        20190321151836248.jpg
        20190321151842613.jpg
        20190321151848962.jpg
        20190321151856217.jpg
        20190321151902581.jpg
        20190321151908931.jpg
        20190321151915296.jpg
        20190321151921645.jpg
        20190321151928010.jpg
        20190321151934359.jpg
        20190321151940708.jpg
        20190321151944343.jpg
FTIR: 4
        20190321_151736_A.igm
        20190321_151815_A.igm
        20190321_151854_A.igm
        20190321_151933_A.igm
IRLS: 1
        2019_03_21_15_17_37_R_12 TA=14.1;TB=34.1;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 13 Time: 15:28:55 UTC
        Alt: 2912 ft MSL  Elev: 16 ft  Elevation from DEM Database
        Vel: 118 knots  Heading: 288
```

```
Digitals:  None
MSIC: 12
        20190321152900898.jpg
        20190321152908168.jpg
        20190321152914517.jpg
        20190321152920866.jpg
        20190321152927231.jpg
        20190321152933580.jpg
        20190321152939930.jpg
        20190321152946294.jpg
        20190321152952644.jpg
        20190321152959009.jpg
        20190321153005358.jpg
        20190321153009898.jpg
FTIR: 2
        20190321_152858_A.igm
        20190321_152937_A.igm
IRLS: 1
        2019_03_21_15_29_00_R_13 TA=14.1;TB=34.1;Gain=3
Gamma Runs:  None

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Run: 14 Time: 15:38:04 UTC
        Alt: 2883 ft MSL  Elev: -2 ft  Elevation from DEM Database
        Vel: 114 knots  Heading: 61

Digitals:  None
MSIC: 10
        20190321153809277.jpg
        20190321153816547.jpg
        20190321153822896.jpg
        20190321153829245.jpg
        20190321153835610.jpg
        20190321153841960.jpg
        20190321153848324.jpg
        20190321153854674.jpg
        20190321153901023.jpg
        20190321153907388.jpg
FTIR: 2
        20190321_153807_A.igm
        20190321_153846_A.igm
IRLS: 1
        2019_03_21_15_38_09_R_14 TA=15.4;TB=35.4;Gain=3
Gamma Runs:  None

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Run: 15 Time: 15:43:09 UTC
        Alt: 2831 ft MSL  Elev: -1 ft  Elevation from DEM Database
        Vel: 132 knots  Heading: 213

Digitals:  None
MSIC: 9
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        20190321154316149.jpg
        20190321154322515.jpg
        20190321154328864.jpg
        20190321154335213.jpg
        20190321154341578.jpg
        20190321154347927.jpg
        20190321154354292.jpg
        20190321154400641.jpg
        20190321154406991.jpg
FTIR: 2
        20190321_154313_A.igm
        20190321_154352_A.igm
IRLS: 1
        2019_03_21_15_43_15_R_15 TA=13.4;TB=33.0;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 16 Time: 15:52:14 UTC
        Alt: 2836 ft MSL  Elev: 14 ft  Elevation from DEM Database
        Vel: 123 knots  Heading: 272

Digitals:  None
MSIC: 11
        20190321155219989.jpg
        20190321155226354.jpg
        20190321155232703.jpg
        20190321155239973.jpg
        20190321155246322.jpg
        20190321155252687.jpg
        20190321155259037.jpg
        20190321155305386.jpg
        20190321155311751.jpg
        20190321155318100.jpg
        20190321155324465.jpg
FTIR: 2
        20190321_155217_A.igm
        20190321_155257_A.igm
IRLS: 1
        2019_03_21_15_52_20_R_16 TA=10.6;TB=30.6;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 17 Time: 15:58:06 UTC
        Alt: 2787 ft MSL  Elev: 18 ft  Elevation from DEM Database
        Vel: 110 knots  Heading: 271

Digitals:  None
MSIC: 14
        20190321155811353.jpg
        20190321155818622.jpg
        20190321155824987.jpg
        20190321155831336.jpg
```

```
        20190321155837686.jpg
        20190321155844052.jpg
        20190321155850401.jpg
        20190321155856750.jpg
        20190321155903115.jpg
        20190321155910369.jpg
        20190321155916734.jpg
        20190321155923083.jpg
        20190321155929433.jpg
        20190321155935797.jpg
FTIR: 3
        20190321_155810_A.igm
        20190321_155848_A.igm
        20190321_155927_A.igm
IRLS: 1
        2019_03_21_15_58_12_R_17 TA=20.0;TB=37.7;Gain=3
Gamma Runs:  None

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Run: 18 Time: 16:05:46 UTC
        Alt: 2895 ft MSL  Elev: 22 ft  Elevation from DEM Database
        Vel: 116 knots  Heading: 87

Digitals:  None
MSIC: 10
        20190321160552589.jpg
        20190321160558938.jpg
        20190321160605287.jpg
        20190321160611652.jpg
        20190321160618906.jpg
        20190321160625271.jpg
        20190321160631620.jpg
        20190321160637969.jpg
        20190321160644335.jpg
        20190321160645240.jpg
FTIR: 2
        20190321_160550_A.igm
        20190321_160629_A.igm
IRLS: 1
        2019_03_21_16_05_52_R_18 TA=19.7;TB=39.7;Gain=3
Gamma Runs:  None

------------------------------------------------------------------

Run: 19 Time: 16:38:48 UTC
        Alt: 2906 ft MSL  Elev: 24 ft  Elevation from DEM Database
        Vel: 116 knots  Heading: 83

Digitals:  None
MSIC: 8
        20190321163854554.jpg
        20190321163900903.jpg
        20190321163907253.jpg
```

```
        20190321163913617.jpg
        20190321163920871.jpg
        20190321163927236.jpg
        20190321163933585.jpg
        20190321163939950.jpg
FTIR: 2
        20190321_163852_A.igm
        20190321_163931_A.igm
IRLS: 1
        2019_03_21_16_38_54_R_19 TA=19.6;TB=39.6;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 20 Time: 16:43:29 UTC
        Alt: 3048 ft MSL  Elev: 23 ft  Elevation from DEM Database
        Vel: 113 knots  Heading: 104

Digitals:  None
MSIC: 19
        20190321164335091.jpg
        20190321164342360.jpg
        20190321164348710.jpg
        20190321164355074.jpg
        20190321164401425.jpg
        20190321164407774.jpg
        20190321164414139.jpg
        20190321164420488.jpg
        20190321164426837.jpg
        20190321164434107.jpg
        20190321164440472.jpg
        20190321164446821.jpg
        20190321164453170.jpg
        20190321164459535.jpg
        20190321164505884.jpg
        20190321164512233.jpg
        20190321164518598.jpg
        20190321164524948.jpg
        20190321164531312.jpg
FTIR: 3
        20190321_164333_A.igm
        20190321_164412_A.igm
        20190321_164452_A.igm
IRLS: 1
        2019_03_21_16_43_35_R_20 TA=24.4;TB=44.7;Gain=3
Gamma Runs:  None

-----------------------------------------------------------------

Run: 21 Time: 16:54:37 UTC
        Alt: 2947 ft MSL  Elev: 16 ft  Elevation from DEM Database
        Vel: 118 knots  Heading: 291

Digitals:  None
```

```
MSIC: 11
        20190321165443319.jpg
        20190321165449669.jpg
        20190321165456033.jpg
        20190321165502383.jpg
        20190321165508732.jpg
        20190321165515097.jpg
        20190321165521446.jpg
        20190321165527811.jpg
        20190321165534160.jpg
        20190321165540509.jpg
        20190321165546874.jpg
FTIR: 2
        20190321_165440_A.igm
        20190321_165519_A.igm
IRLS: 1
        2019_03_21_16_54_43_R_21 TA=24.7;TB=44.7;Gain=3
Gamma Runs:  None
```